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Astrophysical Probes of Dark Matter

ANA BONACA, Institute for Theory and Computation Harvard-Smithsonian Center for Astrophysics

Orbits of individual stars in the Milky Way trace the underlying gravitational potential, and as such, they provide a unique insight into the distribution of matter in our galaxy. Large astronomical projects like Gaia, SDSS and DESI are now measuring precise motions of stars deep into the dark matter-dominated outer regions of our galaxy. I will discuss how these measurements allow us to precisely reconstruct the 3D distribution of dark matter throughout the galaxy, and for the first time, open the possibility of identifying individual dark-matter substructures.